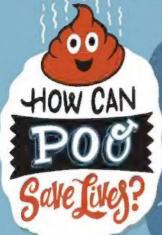
ВВС

FOCUS MAGAZINE COLLECTION

## BIG BOOK OF MIND-BIOWING

## ANSWERS.



WHYDO CATS WATER? WHY WERE DINOSAURS
BIGS

GARLIC BREATH STINK?

Blips Shirt!

SWEATY FEET
SMELL CHRESE?

COULD A

into the

IF YOU HOLD IN A

WHERE DOES IT GO?

+ flowdor + flow

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## CERTIFICATE OF HIGHER EDUCATION IN ASTRONOMY BY EVENING STUDY AT UCL

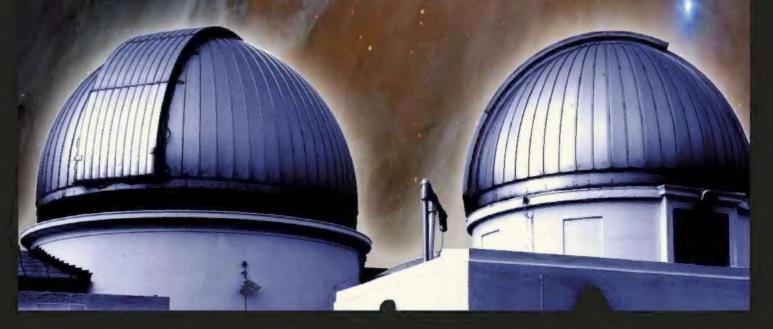
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While every attempt has been made to ensure that the content of Health Breakthroughs was as accurate as possible at time of press, we acknowledge that some information contained herein may have since become out of date. Also, the content of certain sections is occasionally subject to interpretation, in these cases, we have favoured the most respected source.



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## Hello!

Life is full of questions. Why do cats hate water? Can VR trick your brain? Could an asteroid smash Earth out of its orbit? Why do sweaty feet smell of cheese? Wonder no more, because we are here to feed your curiosity. Our **giant 25-page Q&A section** (p64) answers all your mind-blowing questions about the human body, animals, space, dinosaurs, food, and much more.

If you're hungry for more stuff, then don't miss our bigger investigations, like what will happen when a spacecraft plunges into the Sun (p24), and what the tiny bugs in our bodies really do (p56). You can also discover if we could let wolves loose in the UK (p49), or what we'll see when we scour the depths of Loch Ness (p16), and find out why plastic isn't fantastic (p32).

If you fancy something more hands-on, then we've got some awesome experiments you can do in the kitchen. Best of all, you can scoff them when you're done (p40)! We're partial to some unicorn noodles ourselves...

And that's not all, be amazed by a scientist who explores creepy caves (p92), make some magic with the new Harry

Potter wand (p30) and snuggle down to find out more about hibernation (p62).

We'd love to hear what you think about this special kids' issue of *BBC Focus*, so drop us an email to **reply@sciencefocus.com**Stay curious!

Alice Lipscombe-Southwell, Editor

## MARVELLOUS MINI POSTERS TO CUT OUT AND KEEP





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Feeling hot, hot, hot



Slurp up some unicorn noodles

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  Say hi to a stargazer.





## Dive, dive, dive!

You won't find this suit for sale in the shops! Dubbed the Exosuit, this 'atmospheric diving suit' was made by Canadian undersea technology specialists Nuytco Research Ltd. It is made from tough aluminium and is used for building work at marine oilfields around the world. However, it has also been used to explore a 2,000-year-old shipwreck on the Greek island of Antikythera. Using the suit, divers can descend to a depth of 300m, and it has enough oxygen to keep them breathing for up to 50 hours – though dives typically don't last more than a few hours.

PHOTO: NATIONAL GEOGRAPHIC







## IT'S

The punky green 'hair' on the turtle is actually algae that grows on its head and body

Flyboard Air, can reach heights of 3,000m manage up to 10 minutes of flight on a full tank of fuel, long enough to travel around Franky Zapata, is the only person trained to fly the Flyboard Air, but the company also has a safer version called the EZ-Fly. If you fancy it, you could take to the skies too. All you need is some spare time for training, a cool £213,000, and a daredevil streak.



## NASA SPACECRAFT PEERS AT JUPITER'S STORMY WINDS

This awesome snap of Jupiter's south pole was captured by NASA's Juno space probe on a flyby at the beginning of the year. It shows a swirling mass of storms unlike anything else in our Solar System.

Juno entered Jupiter's orbit in July 2016. It has repeatedly zoomed over the planet, peering deep beneath the clouds into the atmosphere below and studying its auroras, structure and weather.

The information from Juno shows violent cyclones that stretch deep into Jupiter's atmosphere. Its north pole features a central cyclone surrounded by eight smaller ones, while its south pole contains a central cyclone surrounded by five smaller cyclones.

Auroras are
natural phenomena that
occur when the Sun
interacts with particles in
the planets' atmospheres,
creating swirling, flashing
colours in the sky. On
Earth, these are seen as
the Northern Lights.







Facial recognition lets teachers spy on pupils

Number 11 High School in China to Identify pupils who

classroom behaviour management system', or 'Smart

sad, disappointed, angry, scared and surprised. It can



creatures whole. In the image above, a snailfish's last meal of a

crustacean can be seen glowing green in its stomach. Yum!



## A helicopter is going to Mars

NASA has built a helicopter that will travel to the Red Planet as part of the Mars 2020 Rover mission. The helicopter weighs just under two kilograms and has two rotors stacked on top of each other that spin in opposite directions at almost 3,000 rpm – 10 times the rate of a helicopter on Earth – to keep it in the air in the thin Martian atmosphere, its batteries are charged via solar power and it is fitted with a heating mechanism to prevent it from freezing during the chilly Martian nights.

The helicopter will be delivered to the Red Planet by the Mars 2020 rover, and will then pilot itself on its first flight.

## DISNEY ROBOTS ARE AWESOME ACROBATS

Disney's new stunt robots can flip through the air like expert trapeze performers, hitting the nets perfectly every time

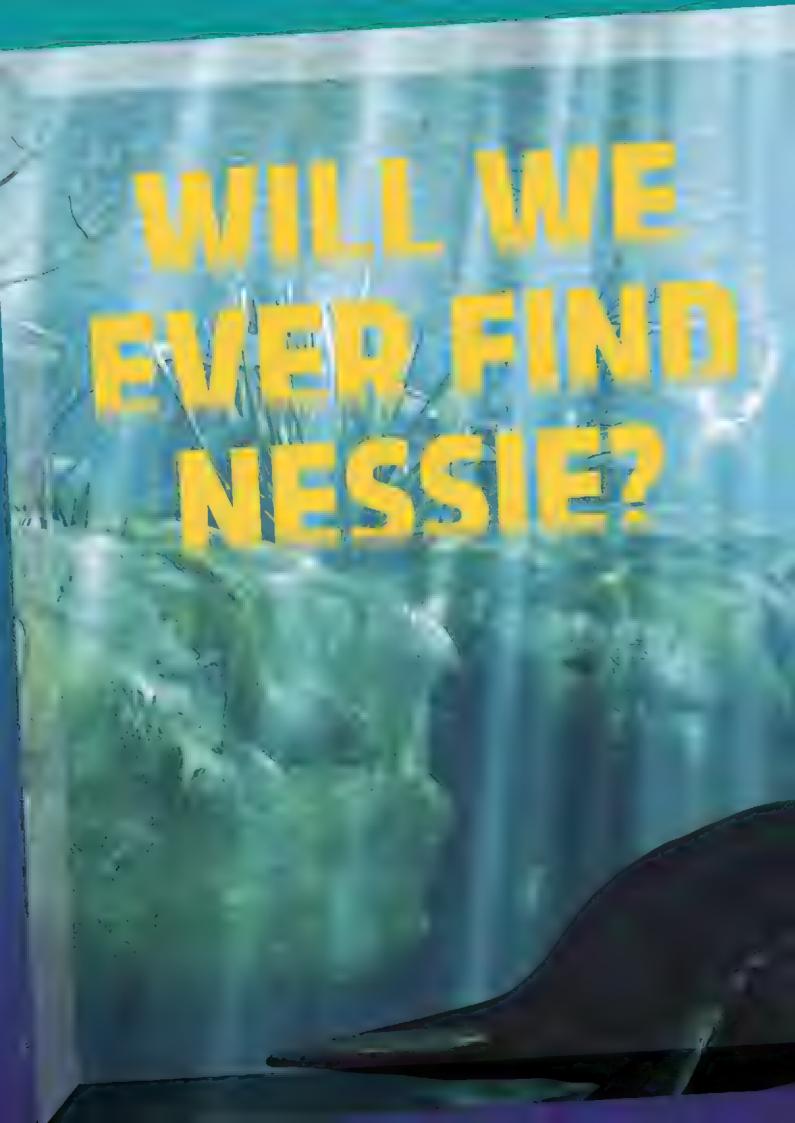
Disney researchers originally created
Stickman, a long, thin robot capable of tucking up into a Z-shape for a smooth backflip
They've been improving Stickman at a rapid pace and have now introduced
Stuntronics (pictured), which is their next-generation somersaulting robot.

After being flung from the end of a wire, the 41-kilogram figure can somersault, twist and then extend its legs to slow down and make a perfect landing

Disney's mission is to create realistic robot figures that can perform tricky acrobatic stunts at its theme parks ©

## **BROUGHT TO YOU BY THE TEAM BEHIND** Visit sciencefocus.com/sciencefocuspodcast or find us on iTunes. ACast, Stitcher, and many of your favourite podcast apps

In each episode, we talk to some of the brightest minds in science about the ideas shaping our future:







- This image, known as 'the Surgeon's Photograph', was taken in 1934. It became famous but was later found to be a fake
- Every year, sightseers
  flock to Loch Ness In the
  hope of spotting a monster
- © Loch Ness is about 37km long. Its water is especially dark, as it contains a lot of peat from the surrounding soil
- Prof Neil Gemmel
  Is hunting for Nessie
  Justing eDNA

ack in 1933, a man called George along a road near Loch Ness.

Ever since then, the Loch Ness lithersh anyther of the month of the lock the lock that the Dock the

Place the Spices of Experience and Spices of the such an animal angle really exist in the lock's marky depths. Research teams the patient of weeks at a time, submaring a explored its deep dark material and expensed from the 1960s to 1980e, during a golden age of Nessie hunting. Yet an monster has been found.

Nevertheless, there have been more than 1900 machine lightings that had the local more than liops of machine particular plants of the liops of machine lighting and lighting that liops of the liops of

Zealand led a trip to Loch
Ness, using a new scientific
and solve the mystery once
and for all. He set out to
search for something called
environmental DNA', or eDNA
tor short. (Vo find
out more about eDNA, see
opposite page.)

## All life contains DNA, How

DNA is structured - how its sections are arranged - varies from one species to the next. As a result, if scientists find a skin fragment, a tooth, a bone or some other part of an animal, they can collect DNA from it and find out what animal it comes from.

During the
1990s, scientists
realised that skin cells,
saliva, urine and dung can be
collected from the environment
and tested for DNA This is
environmental DNA – eDNA for
short – and it has now been
discovered in soil, ice,
streams, ponds and
even the ocean

Once an interesting sample of ice, soil or water has been collected, it is analysed in the laboratory for DNA traces. Any DNA fragments that are discovered are copied and compared with existing DNA records to see which species can be identified in the sample.

Most eDNA
discovered so far belongs
to living species already
known to science However,
some eDNA has been found from
extinct animals, like mammoths
and giant sloths. This proves that
eDNA can last for thousands of
years if the conditions are
right.

Perhaps the most
exciting eDNA results
are those that reveal an
animal that's previously been
unrecorded in the area being
studied. Several eDNA projects on
seawater have found evidence for
animals that were otherwise
unknown from the area,
including sharks and

## What could Nessie be?

## STURGEON?

Sturgeons are prehistoric-looking fish (sometimes more than five metres long) that swim up rivers during the breeding season Some Nessie sightings could be of sturgeons

## **WEIRD WAVES?**

Movements in the rock layers deep below Loch Ness could result in weird waves that make people think that they are seeing a monster

## GIGANTIC EEL?

Some experts suggest that Nessie could be a gigantic eel that has become trapped in Loch Ness and has simply grown to an enormous size

## **FLOATING** TREE TRUNKS?

Floating masses of vegetation and tree trunks sometimes emerge on the surfaces of big lakes A few Nessie sightings might be explained in this way

## This is the same of the same o PLESIOSAUR?

Plesiosaurs were marine reptiles that died out 66 million years ago The idea that Nessie might be a surviving plesiosaur remains a popular idea.



A Committee of the comm Live this and own piding initial plants - Semmel wondered if cDNA tourist by collected from noneplan of man lakan tions different prints of heal kieni. He put togethan a roneach ton i rised the money needed to complete the project, and set to work.

Right new or and still warring be the results from Gammell's project But even if eDNA evidence for Nessic is no discovered, the project in still useful because it could help provide a complete list of every plant and animal species living in Loch Ness

The ground that the proper is interest the baseination of the public meluding children and Commolisted
his inem hase had leads at opportunities In talk about their exciting asserch, mad about eDNA and DNA in general

he will this project really solve the mystery of the lock blood Monaton Maybe it will, maybe it would But either tray, it has to be considered a record Not only will it help wifind out exactly what wildlife lives in Lock Ness, but if has also got people super interested in the science behind it. We can't wait to find out what's hiding in the water! @

och Ness, taken by a tour mat captain, revealed a eper section known a r - Airys, which some plothink could be a

Feltham, a man who is a

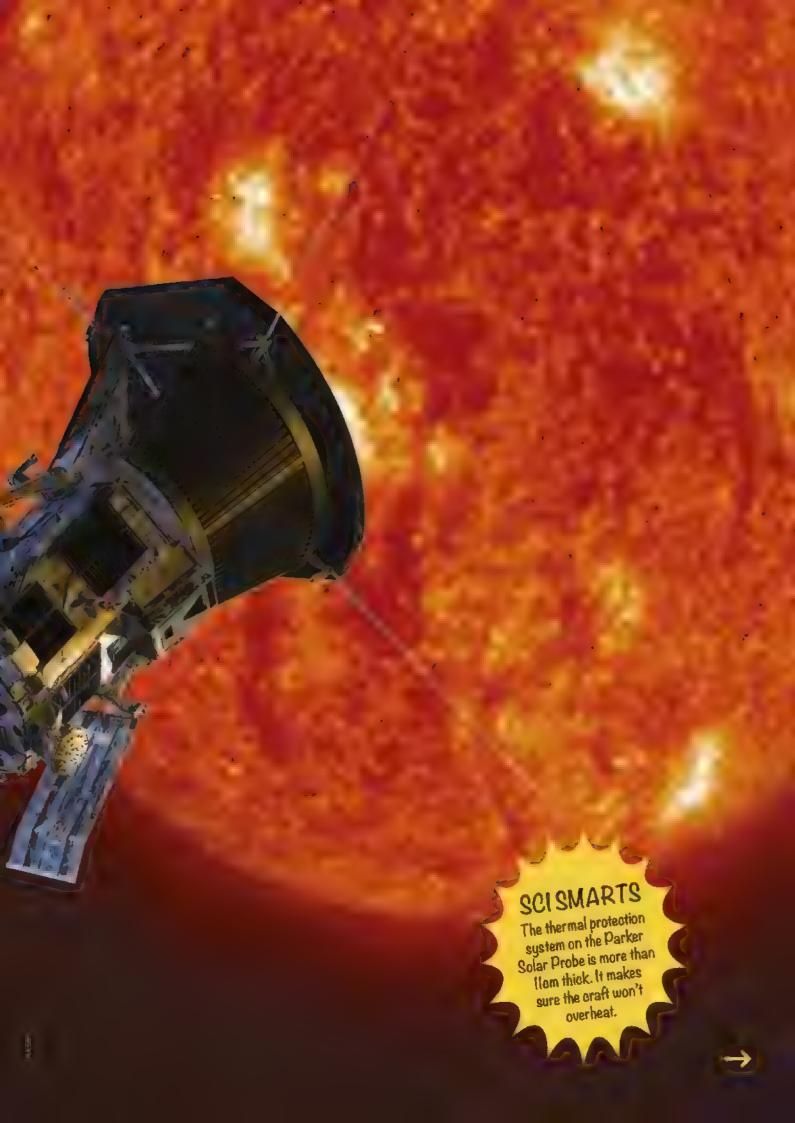




# COULD A SPACESHIP FLY INTO THE SUN?

The Parker Solar Probe is currently zooming its way across space towards the Sun. But just how close will it get, what will it find, and will it survive its daredevil mission?

WORDS: ELIZABETH PEARSON





Parker will get seven times closer to the Sun than we've ever been before, arriving just over six million kilometres away from it. That might not sound very close, but in space terms it's right next door.

It's not going to be easy. To get into the Sun's orbit, Parker doesn't just have to travel the 150 million kilometres to reach it—it also has to match the Sun's speed. The faster Parker goes, the closer it can get

This looping orbit also gives Parker
the chance to get a speed boost from
Venus using something called a 'gravity
assist'. This is where a spacecraft flice
past a planet and gets pulled along by
gravity. The craft is only dragged with the
planet for a few seconds, but it ends up
travelling much taster.

ABOVE: In this image of a solar eclipse, the bright centre of the Sun is being blocked out by the Moon, which means the corona, can be seen

## INSTANT GENIUS

How fast will Parker go?

a half minutes



Won't Parker melt?

- 12 - Alports almost ly more worned as

toasty warm



ls the Sun like other stars:

LITE LITE

the first because him

ime, it has cooked some of

like helium.



How hot is the Sun?

is 5,500°C, but deep 



How big is the Sun?

It's 1.4 million kilometres across. You could fit over a million Earths



How old is the Sun? .....

"The spacecraft will fly right through the Sun's outer layer"

Parker gets its first speed boost in: November this year. Over the next : seven years Parker will fly past Venus another six times. Each time it does, the spacecraft will have a speed boost and get a little nearer the Sun. Eventually the spacecraft will be going fast enough to zoom right through the Sun's scorching outer layer, the corona.

The corona is a cloud of superhot gas called plasma, which summed the Sun. Normally, we can't see the corona because it's dim and the Sun is brighta It's like trying to look at a tablet screen outside when the Sun is shining wyou! can't see anything! You can only see the corona during a solar eclipse when the Moon blacks out the bright centre of the Sun, revealing a wispy 'crown'



"Parker is venturing where humanity has never been before. Who knows what we might find?"

Astronomers think the Sun will die out in about 10 billion years' time. Before that, it will turn into a red giant star.

ABOVE: Earth's magneticfield (coloured blue in this image) protects us from the solar wind and solar flares. reaching out from where the Sunshould be ('corona' is the Latin word for through the corona, giving us a look at a region we don't know much about

What scientists have learned about the corona already has made them even more curious. It's hot. Really hot. Temperatures in the corona can be a thousand times hotter than the surface of the Sun! That just doesn't make sense. If you walk away from a fire, the airgets colder. So why does the corona get hotter as you move further away? No one knows, but with Parker, the astronomers at NASA might be able to find an answer to the mystery.

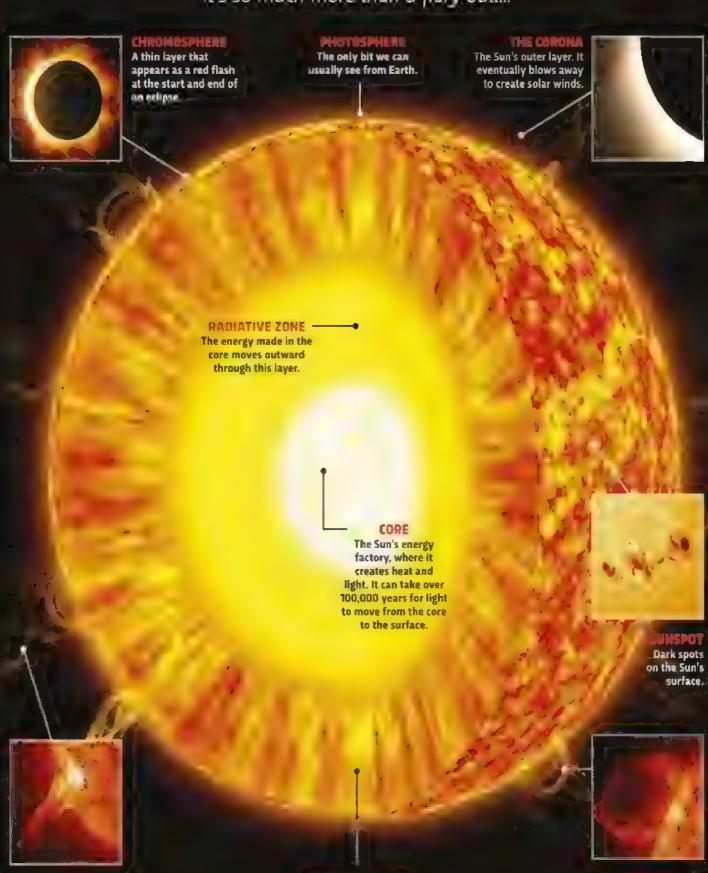
Learning about the corona isn't just about satisfying NASA's curiosity

though. It could also help us to protect devices here on Earth. When the corona gets far enough away from the Sun, it turns into something called a solar wind which blows across the rest of the Solar System. This wind has a lot of energy which makes it dangerous. Humans are safe from it here on Earth, but the satellites we rely on for communication and GPS aren't so lucky. If scientists can understand the corona and the solar wind, then it can help keep our satellites functioning when solar winds hit.

But the most exciting things Parker will find are the mysteries we haven't even thought of yet. It is venturing where humanity has never been before. Who knows what we might find by flying through the edge of a star?

## **THE SUN**

It's so much more than a fiery ball...



Occasionally a prominence: will escape from the Sun, becoming a flare. The heat makes the plasma (superhot gas) tumble about. ROMINENCES

Huge plumes of plasma that erupt out of the Sun, forming loops and theets:



## CODE SOME

Unleash your inne Harry Potter of Hermione Granger with wave of this wand

S till no letter from
Hogwarts? Never mind,
while you're waiting
you can build your very own
how the state of Ollins der

The line of the term of the line of the control of

From the world to be the month world to be the continued by the problem of the problem of the continued by t









o you know how many times a day you use something made from plastic?

I starts a soon you get out of bed in the morning and put on your clothes. You might not have shirt, socks and even your underwear contain plastic threads that make them cheaper, stronger and stretchier, or even

After putting your clothes on, there's breakfast. Cereal comes out of a plastic toast. Then you'll probably clean your brush your hair with a plastic comb.

group of substances that includes

SCI SMARTS

The Great Pacific
Garbage Patch is the
largest collection of
floating rubbish on Earth.
It is located between
California and Hawaii.

to soft fabrics, and it has become a part of everything we do in our daily lives because it's long-lasting and strong. But this also makes it incredibly difficult to get rid of.

## PLASTIC PLANET

Not so long ago, plastic didn't exist.

Out the content of cotton and wool, ate food that they bought in

"People who eat
seafood may be consuming
as many as 11 000 pieres
of plastic a year"



## Four solutions to the plastic problem

Stop flushing plastic. Items like wet wipes, contact lenses and disposable nappies contain plastics that block sewers and add to the plastic problem at sea. We should stop flushing them away and consider reusable items instead.

Ban single-use plastics. Under new EU laws, we're set to see the scrapping of drinking straws, plastic knives and forks, and other items that only ever get used once. Companies that can't avoid using them will have to pay for their clean-up.

Reduce fishing waste. Most of the plastic floating in the Great Pacific Garbage Patch is fishing gear, including nets and ropes. The same laws designed to reduce single-use plastics could also make the fishing industry responsible for its own waste.

Reuse and recycle. We can all do our bit by shopping second-hand and sorting our recycling, but there are more creative solutions too. Dutch engineers recently built a cycle path made from used plastic cups and bottles.

on Earth. Of course, we won't be able to see all this waste because it will be under the sea or in landfill sites, but

----THE RESIDENCE OF THE PARTY.

and the later with the same

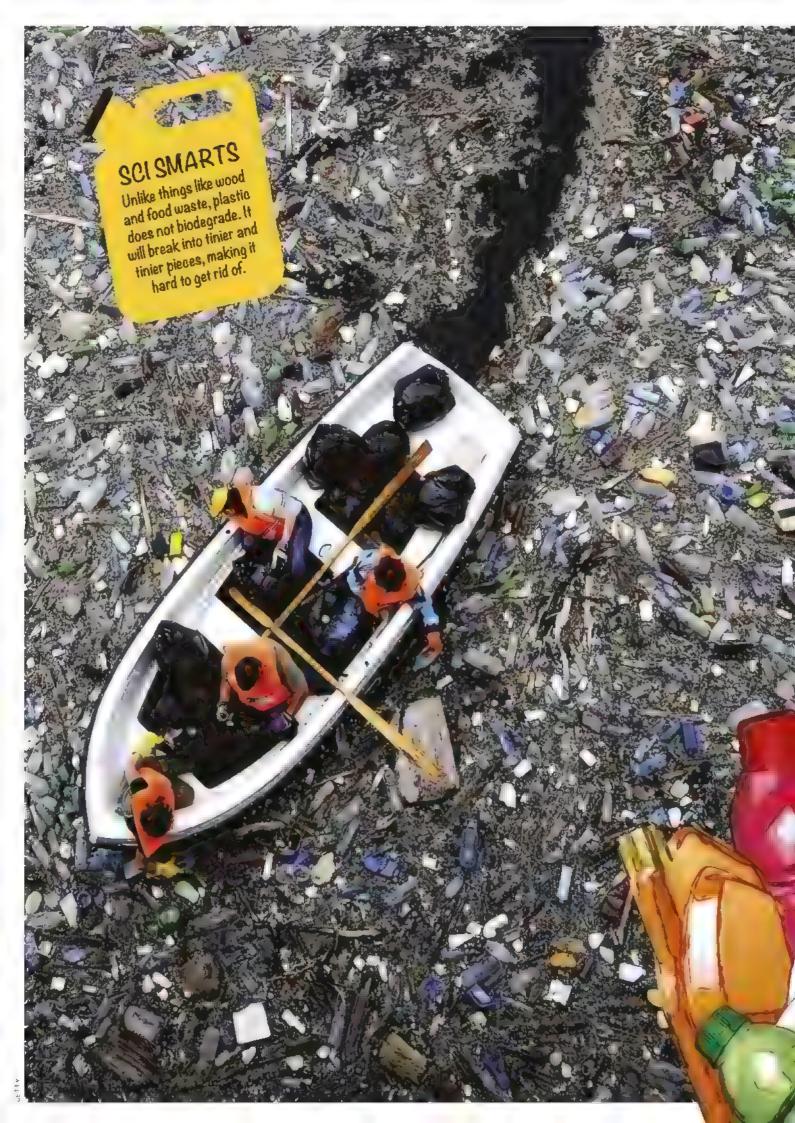
1 Yet it's not known exactly how harmful

ARREST OF THE PARTY OF THE PART

many districts in particular to the late. Local Control of the local Con the second second second second second

\_\_\_\_

reduce our plastic usage.





### HACK YOUR PARENTS' **SHOPPING TROLLEY**

How many plastic-free points can

you pick up when you help your mum or dad with the shopping?

Tick them off and add up your points! See how well you can do...

#### NAKED FRUIT AND VEG

Who needs their potatoes in a plastic packet? Take a canvas bag with you, and grab the loose stuff.

3 points per item =

Pick peanut butter, spreads and sauces in glass jars and bottles that can be reused or recycled.

GLASS JARS

1 point per item =



How about making your own jam with naked fruits?

10 bonus points! ≈ (



#### . ULO SNACKS

Multipacks contain lots of little plastic packets. So go for bigger, single packets of popcorn, crisps, yoghurt and nuts. Just promise not to pig out!

1 point per item = (

#### OVER THE COUNTER

Get meat or cheese at the counter, where it's often sold with less packaging.

2 points per item = (



Some supermarkets will even let you take your own reusable containers.

5 bonus points = {



#### THE LAST STRAW

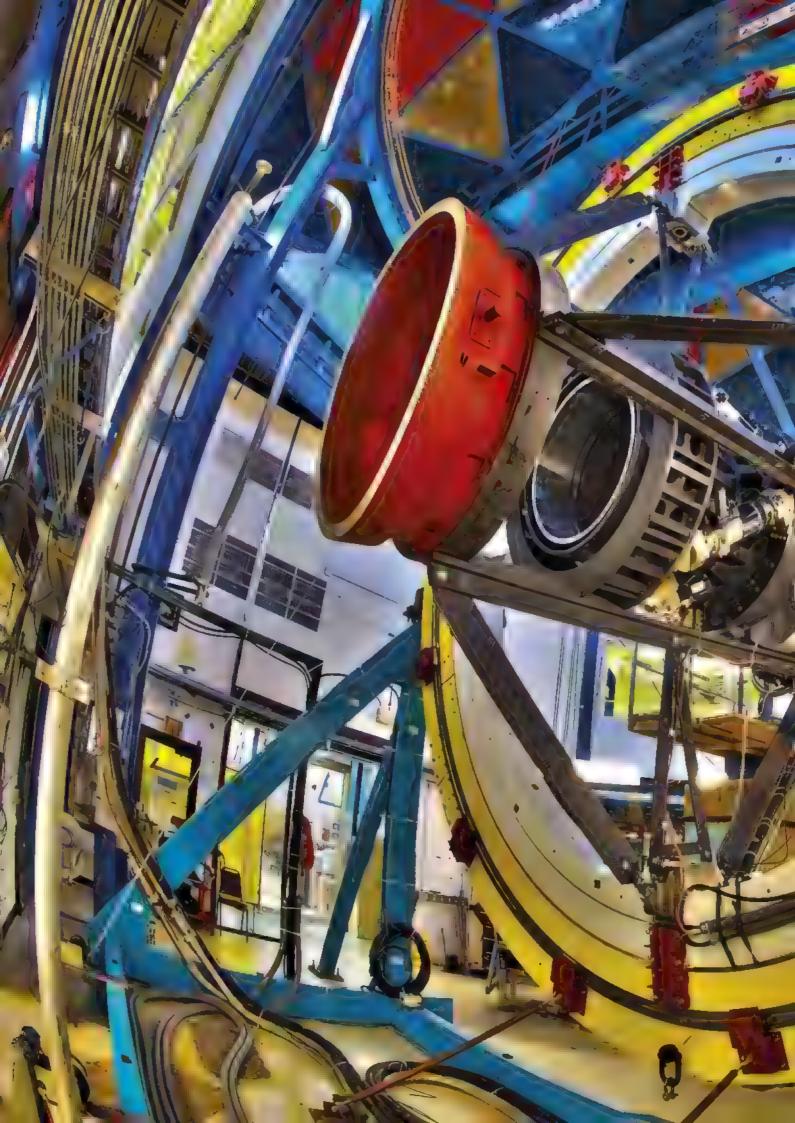
Having a milkshake in the supermarket cafe? Slurp it up without using a straw!

3 points =



TOTAL POINTS =







# 

Transform your kitchen into a science lab words MICHELLE DICKINSON

## Candy crystals

Watch in awe as you grow your own edible, crunchy, candy crystals. The longer you leave them, the bigger they get!



#### You will need

- · Tall, narrow, clean glass or jar
- · 1 cup of water
- · 2-3 oups of sugar
- · Food colouring
- · Wooden skewer
- · Clothes peg
- · Saucepan

- 1. Heat the water in a saucepan over a low heat until it is simmering. Instructions 2. Slowly add the sugar, stirring constantly, making sure that it fully
- 3. Keep adding the sugar until the water starts to look cloudy. This is the point where no more will dissolve. You should end up with some
- 4. Remove the pan from the heat and allow to cool 5. Wet skewer with water, then roll it in the leftover sugar. Leave for a
- 6. Once the sugar solution has cooled, pour it into the glass or jar and
- 7. Clip the clothes peg onto the wooden skewer. Use the peg to suspend the skewer in the centre of the glass, so it's hanging in the liquid. The bottom of the skewer should be approximately 2cm from the bottom of the glass. Leave the glass where it will not be disturbed.
- 8. The crystals should form after three days and will continue to grow.
- 9. You can help your candy crystals to grow by checking for, and removing, any crusty film that forms on the surface of the solution.
- 10. When you are happy with the size of your candy crystals, remove from the solution and allow to dry for a couple of hours before eating.

#### The science behind it...

If you pour a spoonful of sugar into a glass of cold water and stir, the sugar will dissolve. Eventually, if you keep adding sugar to the water it will stop dissolving. However, if the water is heated, more sugar can be forced to dissolve in the water, creating what is called a 'supersaturated solution'. As the water cools, the supersaturated solution becomes unstable since it contains more sugar than it can hold. The sugar then starts to come out of the solution and reforms as solid sugar crystals. As it takes less energy for the sugar crystals to form on top of other crystals than to form on their own in the solution, the sugar-rolled skewers act as seeds for the new crystals to grow. The more the sugar solution cools, and the more water evaporates from the solution over time, the more the sugar comes out of the solution - and the bigger the crystals grow.

Eat these crystals straight off the skewer, or stir into hot drinks





## Instant ice cream

This delicious recipe will give you ice cream in under 10 minutes! And best of all, you can add whatever flavouring you like...

#### You will need

- · One small resealable sandwich bag
- · One large resealable sandwich bag
- 120ml (1/2 cup) cream or full fat milk.
- · 12.6g sugar
- · A few drops of vanilla or other flavouring of your choice
- · 3-7 cups of ice
- · 75g salt

#### Instructions

- 1. Add the cream, sugar and vanilla to the small bag and seal, ensuring that any excess air is released.
- 2. Place the ice, salt and cream-filled bag into the larger bag
- 3. Vigorously shake the large bag over a sink for approximately five minutes. Stop when the cream has started to freeze and
- 4. Remove the small bag and quickly rinse off the salt solution
- 5. Pour the ice cream into a bowl, add your favourite toppings and enjoy eating your newly frozen dessert!

#### The science behind it...

Ice cream is an emulsion, or a mixture of two liquids (water and fats) which do not normally mix together. To make ice cream, the milk or cream muxture needs to change its state from a liquid to a solid. If the mixture was simply placed straight into the freezer, the water component would freeze first, forming large, crunchy ice crystals. Ice cream tastes better when it is creamy rather than crunchy, so the goal is to create the smallest ice crystals possible. By vigorously shaking the bag, any large ice crystals that may be forming are broken up into smaller crystals, resulting in a smooth and creamy ice cream. The freezing point of ice is lowered by the addition of salt, so it starts to melt. As the ice melts it draws heat energy from its surroundings - including the cream mixture enclosed in the smaller bag - cooling it enough to cause the liquid cream emulsion to freeze, changing it from a liquid to a solid.

#### Explore further ...

- )) What happens if you do not shake the bag vigorously when making the ice cream?
- )) If you put too much ice cream in your mouth, you may suffer from what is called 'brain freeze' or an 'ice cream headache'. Placing your tongue on the roof of your mouth should stop the headache - why do you think this is?
- )) Taste the ice cream frozen, then taste it again when it has melted. One should taste much sweeter than the otherwhy do you think this is?



## Unicorn noodles

These amazing and edible unicorn noodles can transform from purple to blue or pink right in front of your eyes...

#### You will need

- · Large saucepan
- · Knife
- · Dried clear noodles (glass noodles work well)
- · Large heatproof bowl
- · Colander
- · Red cabbage
- · Lemon

- 1. Roughly chop the red cabbage leaves and place in Instructions
- 2. Add enough water to the saucepan to half cover the
- 3. Bring to the boil and cook for five minutes on the stove.
- 4. Place a colander over a large heatproof bowl and strain the
- 5. Put the cabbage aside if you like, you can add a pinch of salt and dash of vinegar to make it into a tasty side dish!
- 6. Pour the cabbage water back into the pan and add the noodles. 7. Simmer for 5-10 minutes, until the noodles are soft and purple.
- 8. Use the colander to drain off the water and transfer the
- 9 Squeeze fresh lemon juice onto the noodles and watch them turn pink!

#### The science behind it...

Red cabbage is purple due to a pigment called anthocyanin This same pigment is also found in blueberries. As the cabbage boils, the anthocyanin leaches out into the water. When the dehydrated noodles are added to the cabbage water, the anthocyanin is absorbed. Scientists use a scale called the pH scale to describe how acidic something is, with 7 being neutral. A pH of less than 7 means the solution is acidic, while a pH greater than 7 means the solution is alkaline Anthocyanin changes colour depending on the pH of the solution it is exposed to. When it is neutral (or at pH 7) it is purple, but if it comes into contact with something acidic such as lemon juice, it turns pink. An alkaline solution, on the other hand, would make the anthocyanin turn blue, green or even yellow. In addition to being a tasty snack, the unicorn noodles are also an edible pH meteri



#### Explore further...

- )) What happens when you sprinkle an alkaline material such as baking soda onto the noodles?
- )) Can you estimate the pH value of other household products - such as vinegar or laundry powder - using the leftover cabbage juice?
- )) Using what you now know about anthocyanins, can you explain why the blueberries in blueberry muffins sometimes look green around the edges?





## Confectionery candle

Many candles are thrown away after being used However, with this delicious recipe you can have your candle and eat it!

#### You will need

- · Matches or lighter
- Knife
- Plate
- · Banana
- Almond
- · Chocolate or nut pieces (optional)

#### Instructions

- 1. Peel the banana and cut the ends off to make a flat-based banana cylinder.
- 2. Stand the banana upright on the plate and decorate with chocolate or nut pieces.
- 3. Peel the skin off the almond and carefully cut lengthways to make a thin slice.
- 4. Push the almond slice into the top of the banana.
- 5. Use the matches to light the almond and watch it burn.
- 6. After the experiment, blow out the flame and eat the

#### The science behind it...

Candles are made of two things, a wick and a wax. The wax acts as a fuel, providing energy to the flame, allowing the candle to burn. As the wax is usually solid in a candle, the heat from the flame softens it until it becomes a liquid. The wick then absorbs the liquid wax and pulls it up towards the flame. When the liquid wax reaches the flame it turns into a vapour or a gas that fuels the flame, keeping it burning. For a flame to continue to burn it needs fuel, energy and oxygen. The wax provides the fuel, the initial energy comes from the match, and the candle is surrounded by oxygen in the air. The edible candle also has initial energy from the match and has oxygen surrounding it. Instead of using wax, the edible candle uses the almond as both a wick and a fuel. Nuts are high in energy because they are filled with natural fats. These fats burn slowly and, when lit, provide fuel for the flame. The banana acts as a base for the almond to sit in, and its high moisture content keeps the flame safe and minimises the risk of the fire spreading. •



#### Explore further...

- Do other types of nuts such as cashews or walnuts - work as well? Which type of nut burns for the longest? What do you think that tells you about the nut?
- I) Try other solid fruits as a base, such as an apple or an orange, if you prefer the taste of those.
- Does the thickness of the sliced nut change how easy it is to light? Why do you think that is?



exper ments are taken from The Krtchen Science Cookbookby Dr Michelle Dickinson (£19 99

Nanogirl Labs)

ENGINES THAT RUN
FROM BODY HEAT



Choose from kit or assembled at WWW.STIRLINGENGINE.CO.UK



WORDS HELEN PILCHER

49







DATE OF DISAPPEARANCE:

CAUSE OF DISAPPEARANCE:

## PINE MARTENS

When their woodland habitat was being one of the most common UK carnivores to one of the rarest, with Scottish Highlands. Recently, they were reintroduced to mid-Wales pine martens thrive, red squirrel numbers go up and grey squirrel

prije i ofatte na diamen a side

makes them easier for the pine

species and have also been declining.



#### WOLVES

Wolves hunt large animals like deer. To avoid the wolves, the deer will keep moving, which means they don't nibble too many young trees in one area As a result, wolves help turn grassland into forest. When they were reintroduced into the USA's enormous Yellowstone Park in. 1995, trees shot up and wildlife flourished. Although woives could survive here, we don't have the space they need and some people are worried they might kill farm animals. There are no plans to reintroduce them yet.

> DATE OF DISAPPEARANCE:

CAUSE OF DISAPPEARANCE:



#### EURASIAN LYNX

Lynx help woodlands regenerate by controlling the number of

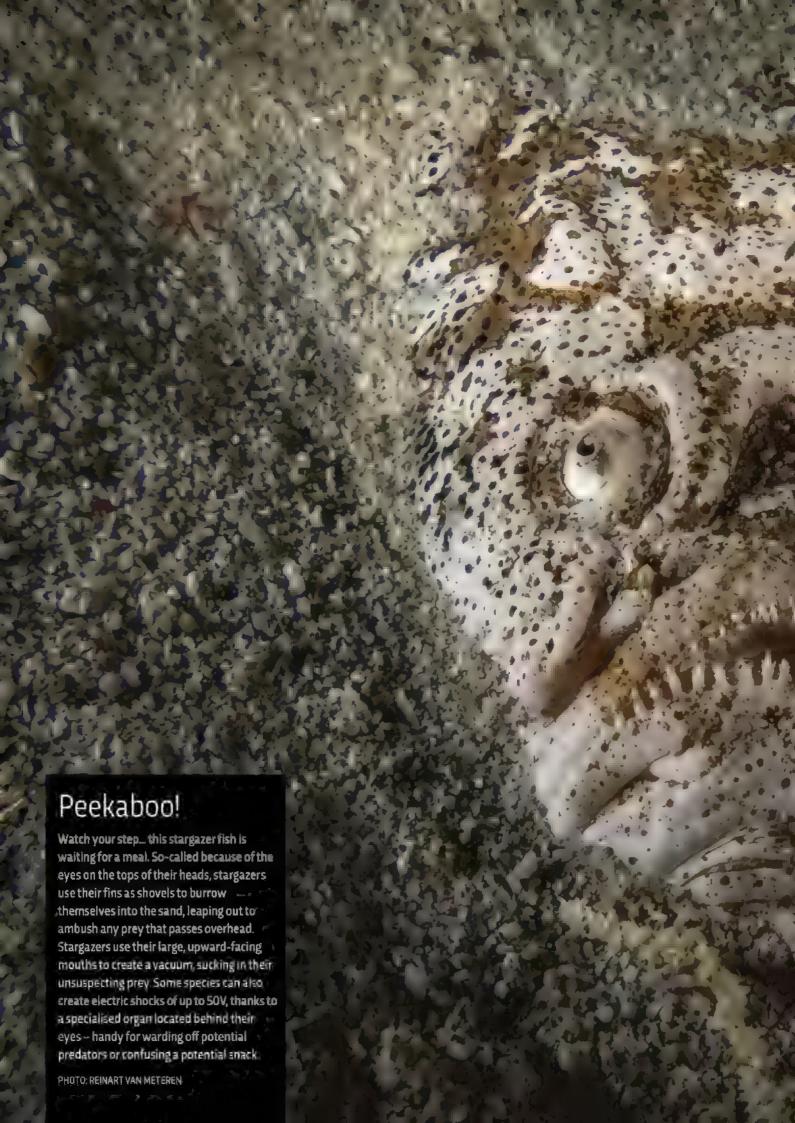
satellite collars and their activity would be monitored.

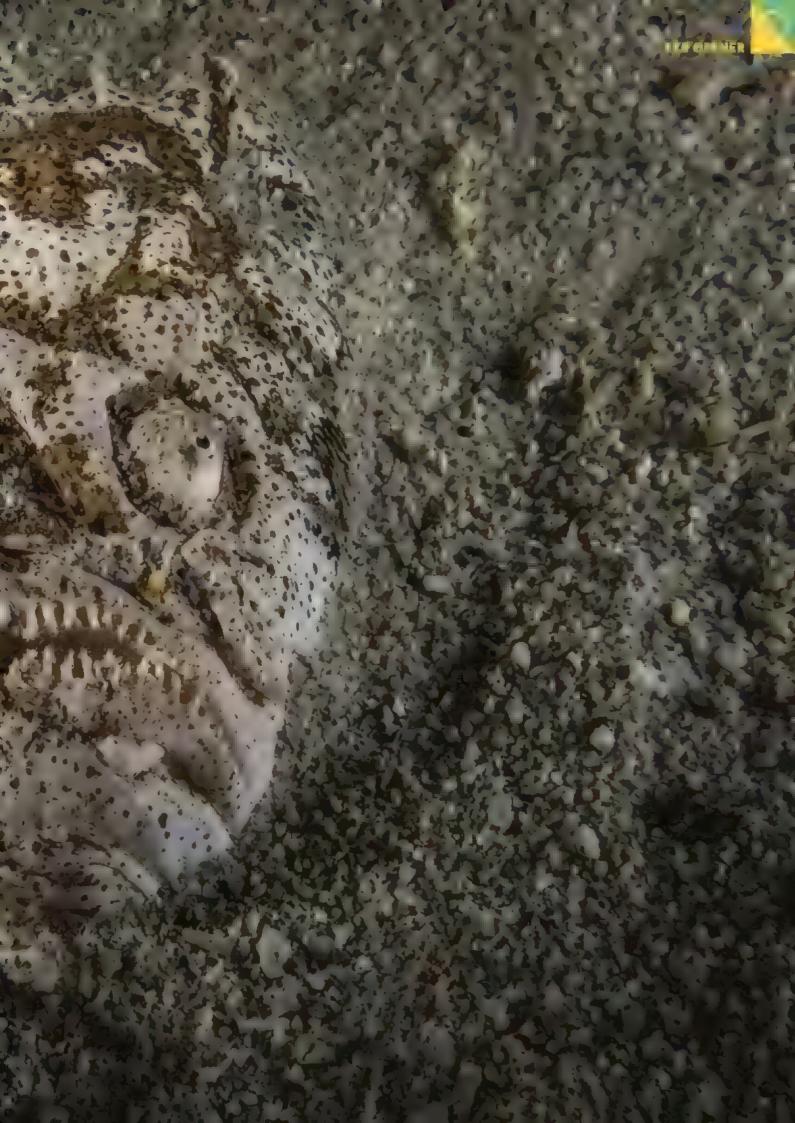
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#### REWILDING JUST AIN'T THAT EASY...

Rewilding is about more than just putting animals into wild places, it can also involve planting trees, pulling down fences and changing the routes of rivers. It's about restoring wild places to the point where nature can be left to look after itself. But not everyone is a fan. Farmers worry that introduced predators, like the lynx, could kill their animals, and that beavers might damage their land. Meanwhile, supporters of rewilding point out: that trees give us oxygen to breathe, absorb carbon dioxide and help prevent flooding. Woodlands can be a rich source of food, medicine and fuel, and connecting with nature is good for our health and wellbeing. @







# LOADS OF BUGS

Microbes are everywhere. They're all over your bed, your computer screen, this magazine, and your hands. Here, we're going to find out a little more about the ones in your body...

Wokass auto-upstombe-southwell

it a sniff. Smell a bit funny? Yes? That's all down to little

your hands (and your belly button!) and we'll find out more.



So, we've established that you're covered with bacteria, but there are lots of other tiny organisms, such as viruses and fungi, that call your body home. All of these put together are known as the 'human microbiome', and scientists are discovering that they are super important.

Yes, we know what you're thinking: bad!" Well, you'd be right - some are really nasty. The flu virus, for example, can make you feel so ill you can't get out of bed, while bacteria that cause food poisoning might mean that you become best friends with the toilet for a couple of days. These bad ones are called 'pathogens'. However, some bacteria, fungi and viruses are helpful, while others might exist perfectly happily in one part of your body but only cause problems if they end up elsewhere. Each part of your body has its own distinct 'zoo' of microorganisms. So, the bugs

on your arm will be quite different to those in your mouth, which will be distinct from those on your feet or in your guts. It's a bit like going for a walk in the woods - on the floor there will be rabbits and foxes, in the trees there will be squirrels and birds, while underground there are earthworms and grubs.



live, and they are also the most important. While you can live perfectly happily without some organs, such as your tonsils or appendix, you wouldn't last long without your gut microbes. To give you an idea of just how many of them there are, if you put all of your gut microbes on a set of scales they would weigh more than your brain! They help you digest food, they affect what diseases you get, and might even play a part in whether you're fat or thin.

Incredibly, everyone's microbiome is unique, so yours will be different to your mum's, your brother's, or your best friend's. Experts think that if you have



## **HOW TO**

#### KEEP YOUR MICROBES HAPPY



STROKE ANIMALS People living with pets have more diverse microbiomes



AVOID JUNK FOOD Your microbes don't like it



DRINK GREEN TEA It's fuel for microbes



EAT LIVE YOGURT It contains lots of friendly bacteria



USE SOAP AND WATER TO SCRUB YOUR HANDS Antibacterial washes kill good bugs as well as bad ones



EAT LOADS OF FRUIT AND VEG Variety is important, as they will support different species of microbes



SPEND LOTS OF TIME OUTSIDE It's great for your microbiome



EAT NUTS, SEEDS, BERRIES, OLIVE OIL AND GARLIC They feed the good bacteria in your gut





Snuggling down for a few months of rest might seem pretty tempting, but for some animals it's not a choice – it's a matter of survival words ALICELIPSCOMBE-SOUTHWELL

Winter is coming, which means the temperatures are plummeting and food is in short supply. It's okay for us, we can still go to the shops and fill our baskets with tasty treats for the week ahead. But for wild animals, these are tough times. So rather than struggling, some species will find somewhere safe, and then slow their breathing and heartrate. In mammals, the body temperature will also drop. This means the animal uses much less energy to survive the winter, before waking up again when the weather is warmer.

Frogs and TOACS will see out the winter in leaf litter, in compost heaps or under piles of logs. Frogs may even bury themselves in the mud at the bottom of a pond, where they can breather through their skin.

Despite what many people think, south RELS do not hibernate. When it's bitterly cold, they'll stay cosled up in their nest, which is called a drey. They will venture out on warmer winter days to find food that they buried in the autumn.

The UX has a whopping 17 species of GAT that breed here. All of these hibernate from around. November to April, when the insects they eat are hard to find. While hibernating, a bat's heart may beat just 20 times a minute pretty amazing, because when they are flying it can reach 1,000 beats a minute.

looooong hibernation period, from around October until May. But if the weather is especially bad, this may be

three-quarters of the year 'asleep'!
They will fatten up to twice their
normal size before getting snug

A number of British butterfly species, including the small tortoiseshell, comma, peacock and brimstone, will overwinter in sheltered areas. You may see them in sheds or garages. They'll be fine there until the weather warms up again. Other species might overwinter as eggs, caterpillars or pupae.

One of the UK's best-loved animals, the HEDGEHDS, needs to weigh 600g to survive hipernation. If hedgehogs visit your garden, you can help them by putting out non-fishy cator dog food and a bowl of water at dusk every night.

It's not a British species, but the NORTH AMERICAN WOOD FROG is so incredible that we had to include it! When winter is coming, it will hide under some leaves, its heart will stop beating and it will freeze! When it warms up two to three months later, the frog will thaw out and hop off.









#### WILL ELECTRIC CARS REDUCE POLLUTION?

Electric cars don't churn out fumes. so are an obvious choice for

managed with a little for

they are only as green as the

fossil fuels like coal, gas and oil. So charging an electric car can

solar and tidal power, electric cars will become more eco-friendly.



#### HOW DO CHAMELEONS CHANGE COLOUR?

Chameleons change colour to communicate and help regulate their temperature. They possess special cells in their skin called chromatophores that reflect light and contain different coloured pigments. A change in body temperature or mood will result in the nervous system triggering the opening or closing of certain chromatophores. Chameleons can literally 'pick 'n' mix' the colours that are created during this mind-boggling process.

### married and the same.

In the UK, estimates range from six to eight years. But local authorities have been saying this since 2010 and our landfill sites aren't full. This is because councils are recycling more waste. In 2009, 90 per cent of our rubbish went to landfill. It's less than 50 per cent now and forecast to drop to 10 per cent by 2020.



Most of the Earth is covered by sea, and the majority

of land is uninhabited. The European Space Agency

puts the risk of being hit at less than a billion to one

#### Do elephants really never forget?

An elephant has a very large brain for its size and the region of the brain responsible for memory is more developed with a greater number of folds - this results in powerful abilities to recall important survival data such as where to find food and water over hundreds of kilometres, and who is a friend or enemy. The matriarch of a herd (who can live for 60 years) may recognise over 200 individual elephants and can react to the call of a deceased member of her herd two years after their death. So although they undoubtedly forget what they don't need to remember, they appear to remember what they cannot afford to forget!

#### **WHY ARE PAPER CUTS SO PAINFUL?**

At a microscopic level, paper is actually quite rough. A metal knife makes a clean straight cut, but paper acts like a saw blade and does a lot more damage to cells and nerve endings. Paper also leaves behind tiny fibres and chemical residues, which irritate the wound even more.



#### COULD AN ASTEROID KNOCK EARTH OUT OF ITS ORBIT? No. The Earth has a lot of mass and moves extremely quickly in its orbit around the Sun; in science speak, we say its 'momentum' is large. To significantly change the Earth's orbit, you would have to impart a whopping change to the Earth's momentum by smashing into it

manage that.

really hard, and not even the biggest asteroids could

#### yer hold in a fair when closes it go?

Fart gas mostly comes from the bacteria and yeasts that live in the large intestine. If you suppress a fart, it actually just seeps out more quietly, or you might be able to hang on until the next time you are on the toilet. But sooner or later, that fart is coming out!

#### HOW DOES SNAKE VENOM KILL?

Snake venoms contain a cocktail of enzymes and proteins. Some stop nerves working, others interfere with the heart, some rot muscles or cause blood vessels to leak. Snakes can control how much venom they inject with a single bite and tend to use more than the lethal dose. If snake venom doesn't kill quickly enough, the prey may escape or injure the snake - that's why it has to be so deadly.

#### DED YOU REPORT

A black mamba injects up to 12 times the lethal dose for humans in each bite and may bite 12 times in an attack.

#### WHY DO SWEATY FEET SMELL OF CHEESE?

The same bacteria that is used to ripen many cheeses also lives on our skin and eats dead skin cells. It's called Brevibacterium and it gives off chemicals that smell cheesy. Another skin-munching bug is Staphylococcus epidermidis, which produces isovaleric acid that smells cheesy and vinegary. The final ingredient in this 'socktail' is Propionibacterium, which changes sweat into sour-smelling propanoic acid.



#### Why do cats have whiskers?

A cat's whiskers are located on its cheeks, above the eyes, on the chin and the backs of the front paws. These thickened hairs are rooted deeply in the skin and are rich in nerve endings that help our feline friends feel their way through a hunt, especially in the dark. Facial whiskers are approximately the same width as the cat, which helps it judge distance while on the move. Special sensory organs on the tips of the cat's whiskers are able to monitor the distance. direction and even texture of prey. Whiskers also monitor how air is moving around the cat to help it coordinate its movements.

#### HOW COULD I BECOME A FOSSIL?



I PICE THE RIGHT PLACE TO DIE



LET TURNE OUTCOM



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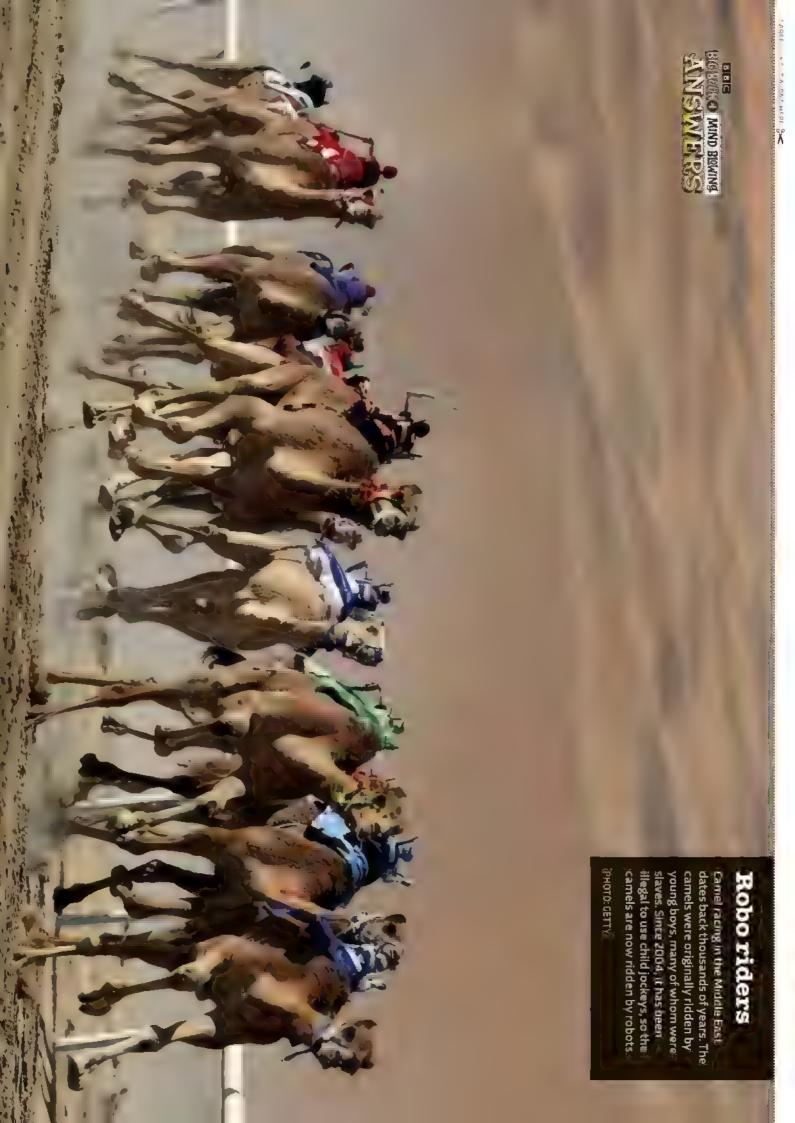


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## Storm surfer

in july 2015, Rwd Bull Air Force athlete Sean MacCormac skysurfed through a surray plummeting at up to 2091m/h (130mph). He eventually opened his parachute and touched down safely in Florida, three kilometres below.

PHOTO: SEAN MACCORMAC



#### DID YOU KNOW?

The spacesuit worn by Neil Armstrong for the 1959 Moon landing was made by a bra manufacturer.



#### Did the astronauts leave anything on the Moon?

The Apollo spacecraft, which took humans to the Moon, were designed to lift off from the lunar surface at a particular weight. Since the astronauts wanted to bring lots of Moon rock back home, they had to leave behind

unwanted items to save on weight. This discarded junk included, among other things, a couple of golf balls, 12 cameras, 12 pairs of boots, a gold-plated telescope and 96 bags of pee, poo and sick! On the Moon, there's no wind, pollution or water to erode,

rust or dissolve all these items – although sunlight has probably bleached the flags left there.

## COULD MY DOG CATCH MY COLD?

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The viruses that cause ordinary colds are all quite specific to a certain species. Dogs can't catch human colds (or vice versa), but they do have their own version, called kennel cough. The flu virus is much more adaptable though. Bird, pig, horse, dog and human flu have all been shown to jump between species. And bacterial diseases are even more contagious. Cats and dogs can both catch tuberculosis from humans, for example.

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#### WHAT HAPPENS IN MY BODY WHEN I BURP

RHIDD



#### 1. EAT AND DRINK

With every mouthful of food or drink, you swallow a couple of millilitres of air Fizzy drinks add another millilitre or so of carbon dioxide.



#### 2. GASES SEPARATE

The gases separate from the food in your stomach and press against the lower oesophageal sphincter, which holds the top of the stomach closed.



#### 3. SPHINCTER OPENS

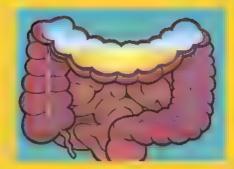
Eventually, the pressure forces the sphincter open and the air rushes out. The belching sound is caused by vibrations in the sphincter and oesophagus wall



#### **AND FART?**

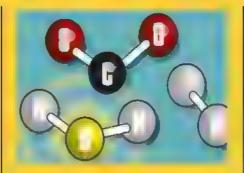
Everybody burps and farts around 2.5 litres of gas per day, which comes from the air we breathe, the drinks we guzzle, and the bacteria in our guts.

#### FART



#### 1. BACTERIAL ACTION

A small amount of swallowed air makes it into the intestines, but most of the gas there is produced by the bacteria that help to digest our food.



#### 2. STINK V SULPHUR

The gas is mainly hydrogen and carbon dioxide. The smell comes from sulphur compounds that are only present in tiny amounts.



#### 3. FART OR POO?

The nerve endings in your bottom allow you to distinguish between a build-up of gas and a solid poo, so you can fart safely without worrying

## WHAT IS THIS? Ent) eme litsert This leggy critise, measuring an Improvious \$2.4cm, is their argust insuit in the overlaints. le big that it would not fit of these two magazine pages unded Phryganistria chinensia ne de linect was discovered) the Guarigas southern Chilleby retire lesses blus out of Mail China, where it into six eggi from the babbles handeed the



#### How do tornadoes rip roofs off houses?

#### SCI SMARTS

The iris is the coloured part of your eye. Its patterns are unique to you. Even identical twins have different iris patterns.

## WOULD A FIGHT HUTT

The first punch might hurt less, because the attacker can't stand firmly on the floor of the spacecran. Some of the momentum of their fist will therefore be

opposite directions to the walls of their

## Can facial recognition software tell identical twins apart?

Identical twins are a good test for facial recognition

systems. When Windows 10 launched, some wondered
whether twins could fool Windows Hello, the
unlocking system that uses facial and iris recognition
unlocking system that uses facial and iris recognition
An Australian newspaper tested it with six pairs of
identical twins, and the system did manage to tell the
twins apart

When it comes to identifying faces, humans are better at judging whether someone looks happy, sad, angry or just a bit shifty. But computers are better at measuring the size and shape of features on a face. Windows Hello is built on technology that combines a webcam, infrared camera and infrared laser projector. This three-pronged approach improves the system, even when confronted with identical twins.



#### HOW CAN I SURVIVE A BEAR ATTACK?







LONT RUN

L DON'T SHOO!

I DON'T PANU



A se-called superfood has an definition. Fruits and vegetables with lots of antioxidants, like blueberries and kiwi fauit, often top the superfood list. There are claims that antioxidants can fight barmful substances in your body, but some studies suggest that dig destroys much of the antioxidant power. However, the foods listed as superfoods are all healthy and will enrich a balanced diet.



#### Why do leaves change colour in autumn?

Deciduous trees drop their leaves to reduce water loss during winter, when it is too cold to grow. But rather than just discard the entire leaf,

HITM DO SHARKS SHELL

When you smell something in the air, it's because scent molecules have dissolved into the wet lining of your nose. Smelling underwater is no different, except that the molecules are already dissolved in the water. It's a myth that sharks can smell a single drop of blood from a mile away. Sharks actually have roughly the same sensitivity as other fish and can detect smells at between one part per 25 million and one part per 10 billion, depending on the chemical and the species of shark. At the top end, that's about one drop of blood in a small swimming pool.



#### HOW FAR DO COUGHS AND SNEEZES TRAVEL? It's horrible when someone standing next to us coughs all over us, as we know it could make ill. But according to research by scientists at the Massachusetts Institute of Technology, it's not just the person next to us we should worry about; coughing spreads droplets as far as six metres and sneezing as much as eight metres. These droplets hang in the air for up to 10 minutes! SCI SMARTS planet or moon needs to have water. In our Solar System, possible elidatus me Maris, Batzerin e Enceladus, and Jupiter's moon Europa. Could we sawd life an amatter glasses? Quite possibly - and scientists try to prevent it from happening during missions into space. Space probes are treated with heat, radiation and disinfectants before launch, to ensure that no Earth-based organisms end up in space. More recently, in 2017, NASA brought its Cassini mission to an end by steering the probe into Saturn's atmosphere, where it would safely burn up. They didn't want it to accidentally crash into the icy moon Enceladus, which could potentially support life.





## Why are bald heads so shiny?

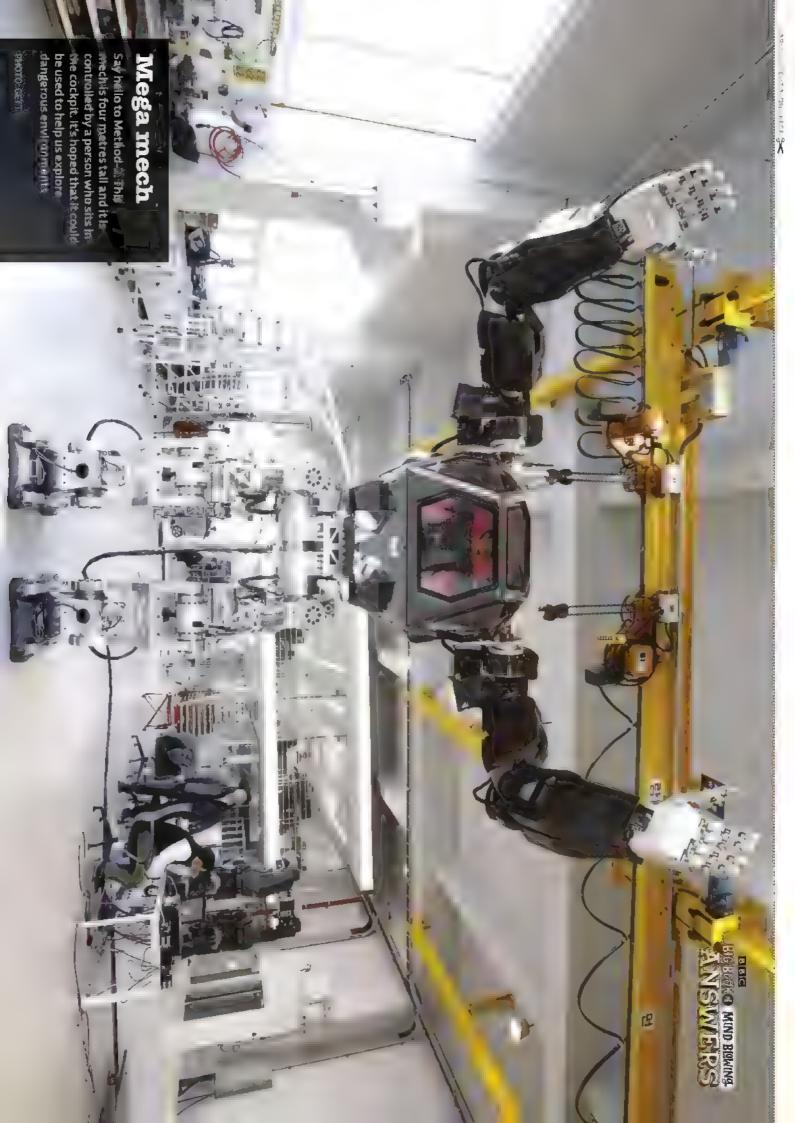
Most of the skin on your body is actually covered with tiny hairs called vellus hairs that give your skin a slightly velvety peach-fuzz look. When men go bald, the hair follicles shrink and turn into skin cells, so there are no hairs at all – not even vellus hairs.

But the scalp is particularly show because of sebaceous glands. These glands release oil and are found all over our skin, but the scalp has a lot more of them. As hald heads have no hair to absorb the oil, it coats the skin instead and makes it look show. What's more, studies suggest that more active sebaceous glands could actually play a role in early hair loss.

## WHY DOES GARLIC MAKE YOUR BREATH STINK?

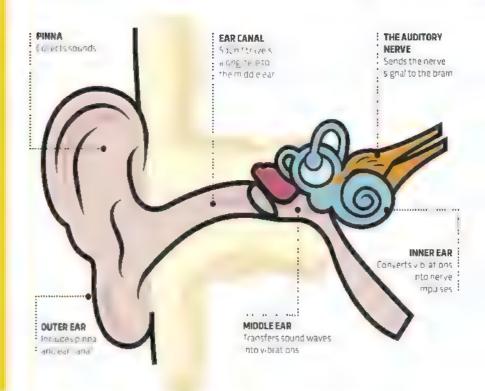
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When raw garlic is chopped, it produces lots of chemicals, most of them stinky. When you eat the garlic, most of these chemicals are broken down in your stomach and liver, but one of them, called 'allyl methyl sulphide' survives and is absorbed into the blood. This means that it can travel through your lungs and into your breath for up to two days.



#### Why do we see shapes and colours when we rub our eyes?

These shapes and colours, called 'phosphenes', were reported as long ago as the time of the Ancient Greeks. Rubbing your eyes increases the pressure within the eyeball and this pressure excites cells in the retina in the same way as light does. Your brain doesn't know the difference, and so interprets it as though you are seeing light from the world outside.



#### DOES THE SHAPE OF MY EARS AFFECT MY HEARING?

Yes. The outer part of your ear, called the pinna, is shaped to collect sounds and locate their sound while moving your head or bending your ears. The changes you notice are what your brain uses to pinpoint the sound's location, and the

pinna's shape exaggerates these variations. In experiments, people wearing false ears have trouble locating sounds for up to six weeks but they don't lose the ability to hear without them. So it is a bit like learning a new language.



#### **CAN COMPUTERS** LEARN LIKE HUMANS?

To make computers learn, we use programs that work the same way as brain cells. These programs are trained with data until they can spot patterns or make predictions about what might come next. But humans are better - we can learn complex concepts and different ideas. We still don't fully understand how brains work, so computers are unlikely to be as good at learning as humans for hundreds of years.

#### How can I tell if a rock fell from space?

Grab a magnet. Most meteorites are rich in iron so they'll stick to magnets. Next, see if the rock's surface is burnt or melted from its passage through the atmosphere. Yes to both of these? Ask a laboratory to test it for nickel content. Virtually all meteorites contain high amounts of nickel, which is at production in all papersons of Time fairly rare on Earth.

TOP 10

#### LONGEST LASTING LANDFILL ITEMS

- Glass pettles
- 3 = Disposable napples Time to break down: 45
- @= Plastic bottles Time to break down: 450
- O Plastic bags Time to break down: 20
- Aluminium cans Time to break down:
- Rubber-soled shoes Time to break down: 50-8
- Tim cans Time to break down: 50 years
- Clothing Time to break down: up to 40 years
- Plastic film Time to break down:
- Paper coffee cups Time to break down:

rclingfilm, magaz



**SGI SMARTS** 





In November, the skies are full of sound and colour. Lots of people like rockets best, like the one shown here. Rockets are packed with exploding shells, known as 'stars', that are launched into the air using gunpowder.

#### ELECTRICAL IGNITER

Fireworks at displays are often synchronised with music. The fireworks are triggered via signals sent through electrical cables, which in turn trigger an igniter charge.

#### (2) IGNITER CHARGE

This consists of a small electrical heating device made from wire that glows hot enough to ignite a mixture; of magnesium powder and potassium nitrate, triggering both the lift charge and the timed fuse.

#### 3 LIFT CHARGE

A large part of the rocket's mass is the lift charge that provides the upward thrust. The lift charge is made from gunpowder, which contains sulphur, charcoal and potassium nitrate. Commercial firework displays sometimes use gunpowder that does not contain sulphur, to reduce the amount of smoke.

#### CLAY NOZZLE

A plug at the bottom of the firework

has a specially shaped hole that directs the gases produced by the lift charge to create thrust

#### TIMED FUSE

This hollow wooden tube is packed with gunpowder. It is designed to burn through just as the firework reaches the top of its arc, setting off the main display burst.

#### **6** SCATTER CHARGE

Another load of gunpowder is stuffed into a cardboard or plastic sphere in the centre of the firework. When the fuse reaches it, the explosion ruptures the firework's outer casing and flings the surrounding star charges in all directions.

#### **7** STAR CHARGES

These are pellets of different metals that burn to produce the colours and effects we see in the sky. For example, copper gives green patterns and strontium is used for red. The star charges may have their own smaller starbursts, fountains or pinwheels inside

#### Could our brains be fooled by virtual reality?

VR can trick the brain in all so ways. In fact, one problem with that it confuses our brains too well. The game you're playing might make you think you're flying in plane, for example, but your balance system located in your ear says you're sitting still. This means that many players end up feeling travel sick.

DIE AOR KHOM!

## WHY CAN'T ALL PLASTICS BE EASILY RECYCLED?

When heated, most plastics either get softer or harder. The ones that get soft can be shaped into any form you like, which also makes them easy to recycle. For example, milk containers can be melted and turned into furniture, plastic water bottles become fleece jackets, and bottle tops can get a new lease of life as storage boxes. Plastics that get harder when you heat them are almost impossible to recycle as they cannot be melted and reformed into new items.



TESSTOCK NASA LOTTEN TO TEST ON TEST

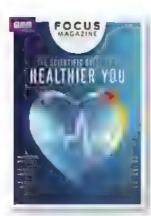




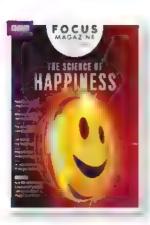
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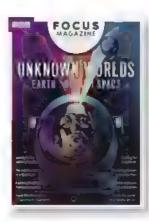




Get fit and healthy!
Discover the science
behind what really
makes you healthier and
fitter, as experts reveal
how to eat, exercise
and sleep well.



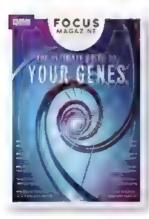
Discover the science behind how to be happy, from stress-busting tricks to taking a tech detox. And find out why the happiest people on the planet keep smiling.



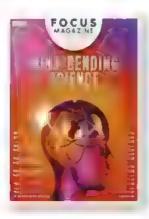
From the depths of the ocean to outer space, this special issue joins the expeditions that are pushing the boundaries on our quest to reach the final frontiers.



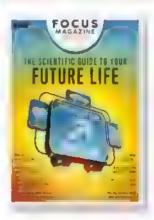
Find out how we can fix climate change, beat mass extinction and protect the planet. Experts reveal solutions to overfishing, plastic waste, flooding and air pollution.



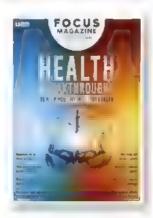
Each life form on this planet has a unique genetic code – DNA Now geneticists are using DNA to improve our health, eliminate hunger and even bring back animals...



Quantum physics, space-time, black holes, multiverses.. The nature of the Universe can make your head spin. But this special edition can help make things easier.



From smartphones to smart homes, technology and science are revolutionising our lives. Discover the innovations that will change your world in years to come.



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CAVE SCIENTIST?

Some scientists have seriously cool jobs! Dr Hazel Barton is one of them...

#### WHAT DO YOU DO?

I'm a cave microbiologist, and I look for microbes that could help us make antibiotics and other drugs. We are also looking at making paint that can heal itself if it cracks, taking inspiration from how stelagmites and stalactites join up.

#### HOW DID YOU GET INTO THAT?

I grew up in Bristol. The mendip caves are near there, and I started caving when I was in comprehensive school. I was terrible at outdoor sport but I loved caves and caving. At school, in our first microbiology lesson, we were asked to go and find microbes. I brushed my hair onto a Petri dish to see what would happen. And then the next day this disgusting thing grew on it. This got me interested in microbiology, and I learned that microorganisms transform the world. around us. When I was at university a: famous scientist who was also a caver encouraged me to combine the two

#### THESE CAVE ENVIRONMENTS ARE WEIRD. COULD THEY OFFER CLUES ABOUT LIFE ON OTHER PLANETS?

Caves can help us find out how life evolved on our own planet, but could also help us find out about life in space. There is a cave in the Amazon - you have

to back your way in with a machete to find it. You've got loads of clothes on because of the killer bees, and have to be careful of all these bugs and anakes that can kill you. But you finally reach the cave and it's two hillion years old and made of iron. Yet there are microbes there eating into the rock. Mars has a lot of iron, so this cave might offer clues about life on the Red Planet.

#### YOU SOMETIMES SPEND DAYS UNDERGROUND. WHAT IS IT LIKE TO SLEEP IN A CAVE?

I'm used to it now! I have my sleeping bag and my pillow, and my whole setup. You do notice the lack of sunshine and you start to get a bit cranky after three or four days, but it's because your brain needs the daylight. I take blue fairy lights into the cave and put them up behind my camp, and that helps. There's nowhere to go to the toilet, so you have to do number twos ina bag and number ones in a bottle And you can't wash your hands as there's nowhere for the dirty water to go. We use wet wipes and hand sanitiser. That's what upsets people the most - the lack of hygiene

#### HAVE YOU SEEN ANY COOL CREATURES IN THE CAVES?

Where we go, deep underground. you don't see them as there is no food or light. At the entrance though, we will see lots of suionals. In Mexico and Brazil, there are loads of creepy crawlies, and in



## Stuff to keep you busy this autumn

#### OUT & ABOUT

Get your trainers on and go!

#### WILDLIFE PHOTOGRAPHER OF THE YEAR 2018

NATURAL HISTORY MUSEUM, LONDON, 19 OCTOBER 2018 – SUMMER 2019 www.nhm.ac.uk/visit/wpy.html

The Wildlife Photographer of the Year competition has been running for 54 years, and each time it features incredible photos of animals and the environment. Visit the Natural History Museum in London for a chance to see this year's entries. The image pictured here was snapped by Adam Hakim Hogg, winning him a prize in the 11-14 age category. It shows a horned tree lizard that was having a life-or-death fight with a centipede. The lizard won... then scoffed the centipede. Ouch.

#### MANCHESTER SCIENCE FESTIVAL

VARIOUS LOCATIONS, MANCHESTER 18-28 OCTOBER

#### www.manchestersciencefestival.com

There's loads of science stuff going on in Manchester this October. You can go to the Ugly Animals Roadshow and marvel at some creepy critters, create an origami frog and then make it jump with static electricity, do experiments in the Wacky Science Lab, and find out how fish poo can save the world.

#### HALLOWEEN SPOOKTACULAR

GLASCOW SCIENCE CENTRE, GLASCOW 26 OCTOBER

#### www.glasgowsciencecentre.org

Visit the Glasgow Science Centre for an evening of spooky activities. There will be a Frankenstein autopsy, a cauldron full of gunge, a planetarium show,

costume competitions, and the chance to escape a zombie apocalypse. THE IMPOSSIBLE GARDEN UNIVERSITY OF BRISTOL BOTANIC GARDEN BRISTOL **UNTIL 25 NOVEMBER** www.bristol.ac.uk/ botanic-garden

The impossible Garden in Bristol features a selection of weird, experimental sculptures that will make your head spin! There are optical illusions, strange reflections and the biggest picnic bench we've ever seen.

#### GAME ON Can you solve the mystery?



#### TOTAL DARKNESS

totaldarkness sciencemuseum org uk FREE

The power's gone out in your town. There's no Wi-Fi, there's no telly, and you can't finish cooking your microwave popcorn. What do you do? Get out there and investigate, of course! In *Total Darkness*, you have to navigate dark streets, form theories and solve problems – all before your torch runs out of battery. Your choices score points for creativity, curiosity and communication. At the end of the game, you'll learn your 'science style' and find out how you can put your skills into action in real life.



# GO STARGAZING Wrap up warm and stare at the night sky

#### BOOK BONANZA

Brush up on your science smarts with these new reads



SO YOU THINK YOU KNOW ABOUT... VELOCIPAPTOR?

BEN CARROD

This pocket-sized book is the latest in Ben Garrod's series about dinosaurs. He combines up-to-date science and a great sense of humour to reveal more about our favourite dinos from *Jurassic World*. Plus, we dig the cute cartoons and the quizzes to test your knowledge.



ABSOLUTELY

CHRISTOPHER ALOYO

This book takes you on a rollercoaster journey through history, starting with the beginning of the Universe, before taking in Earth's history, dinosaurs, wars, robots and more. Just keep it hidden, as we reckon your mum or dad might want it too...



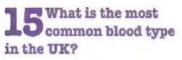
THIS BOOK IS NOT RUBBISH ISABEL THOMAS

£6.99. WPEN & RUOK

We all know that the grown-ups have messed up and now our planet is struggling. But you can help save it. This book contains 50 everyday ideas, like how to use less water when you do the washing-up, to how to make your next birthday party eco-friendly.







- a A
- D b B
- 00

16 How many bones are there in an adult human body?

- a 206
- □ b 285
- ☐ c 170

17 What is the most abundant gas in the air we breathe?

- a Oxygen
- b Nitrogen
- Carbon dioxide

18 According to legend, which famous scientist had an apple fall on his head?

- a Galileo Galilei
- **b** Charles Darwin
- ☐ c Isaac Newton

19 Which of these chocolate bars is also the name of the galaxy in which we live?

a Milkybar



- b Aero
- c Milky Way

20 What does a camel store in its hump?

- a Water
- b Fat
- C Sugar

21 Which is the biggest?

- 🗌 a Tyrannosaurus rex
- b Woolly mammoth
- Blue whale

22 Which is the most acidic?

- a Bleach
- b Lemon juice
- Coffee

25 What is another name for a tidal

wave?

- a Tsunami
- **b** Cyclone
- G Sirocco

24 Which is the only bird with nostrils at the tip of its beak?

- a Ostrich
- b Penguin
- C Kiwi

Tot up how many you got correct...

**0–8**You're a caterpillar!

You've got potential to be incredible, but you could do some swotting up. Start munching through some facts!

> 9-16 You're a pupa!

You've got loads of cool knowledge and you're just waiting to burst out and wow everyone. Keep it up!

17-24
You're a butterfly!

You are super impressive and your knowledge cannot be beaten. Now why not see how well your friends and family do?

7. 6 9, 8 17, 6 20

ANSWERS



F

P

EMDNH

#### WORDSEARCH

Can you find all 15 words in the grid?

	_													
CODING						DATA					DINOSAUR			
DN	A				<b>ENVIRONMENT</b>					<b>EXPERIMENT</b>				
GENIUS					GRAVITY					MARS				
MIC	ROE	BE			PLASTIC					ROBOT				
SPACECRAFT					SUN					TELESCOPE				
I	K	N	M	I	0	R	G	M	U	T	Y	T	8	
G	D	A	T	A	H	T	S	U	I	N	E	G	U	

N H I I D G O E R P M I M U F
X E T D L Y G D O V I C O A S
T Y B A O R I C L S R R Z W O

MNORIVN

FFDPACSWQEEOTXZ

DHAVLEIJCXPBOAW

BNIRLANUAJXEBRM

RTAECKSVJJEOOTI

Y C T C M E S T Y P A E R M M

YWBWSBCSIJQMUMU

CAUZKURAQCIUOVP

DINOSAURPWBLKMF

FXCGMPNFGSRBEVA

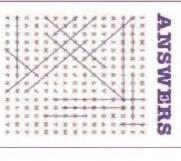
S. Carbon – it's rother ones are NLATCH UP

Calf – Elephant Nymph – Cleade Puggle – Echidn loey – Kangaroc Cub – Tiper

meets 2. Plastypus—It lays the others give birth to live 3. Bicep—It's a muscle in 11. Bicep—It's a muscle in 11. Bicep—It's a carnivore, saurus—It's a carnivore, sers are herbivores. Soon—It's not a metal, all the one-sare.

CH TO E

Elephant, Elver—Eel,
h—It'add, Squab—Pigeon,
h—It'add, Squab—Pigeon,
h—It'dda, Squab—Pigeon,





#### THAT'S ODD ...

Circle the odd one out in each list

1 Mars, Venus, Saturn, Europa

2 Platypus, Dog, Cat, Squirrel

3 Humerus, Radius, Ulna, Bicep

 Diplodocus, Triceratops, Allosaurus, Stegosaurus

5 Carbon, Silver, Gold, Copper

#### MATCH UP

Draw a line to join each baby animal to the correct adult

Calf Kangaroo Elver Echidna Nymph Cicada Squab Rabbit Puggle Elephant Leveret Pigeon Hare Joey Kitten Tiger Eel Cub





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